

DATE 3/23/82

# ADVISORY CIRCULAR



DEPARTMENT OF TRANSPORTATION  
Federal Aviation Administration  
Washington, D.C.

---

**Subject:** CIRCUIT SELECTOR SWITCH

1. PURPOSE: This advisory circular (AC) contains a specification for a circuit selector switch for use in airport lighting circuits.
2. EFFECTIVE DATE. Effective six months after the issue date of this advisory circular, only that equipment qualified in accordance with the specifications herein will be listed in AC 150/5345-1, Approved Airport Lighting Equipment, current edition.
3. CANCELLATION. AC 150/5345-5, Specification for L-847 Circuit Selector Switch, 5000 Volt 20 Ampere, dated September 3, 1963, is cancelled.
4. PRINCIPAL CHANGES. The specification has been rewritten to permit various designs of switches for both 6.6 and 20 ampere circuits.
5. METRIC UNITS. To promote an orderly transition to metric units, the specification includes both English and metric dimensions. The metric conversions may not be exact equivalents, and until an official changeover to metric units is effected, the English dimensions will govern.

A handwritten signature in dark ink, reading 'Leonard E. Mudd'.

Leonard E. Mudd  
Director, Office of Airport Standards

---

Initiated by: AAS-200

## CIRCUIT SELECTOR SWITCH

1. SCOPE AND CLASSIFICATION.

1.1 scope. This specification covers the requirements for a circuit selector switch to be used for switching the output of a constant current regulator to one or more series lighting loops.

1.2 Classification. Four types, two classes, and two sizes of circuit selector switches are covered by this specification.

1.2.1 Type. Circuit selector switches of the following types are covered by this specification:

Type L-847-1	One circuit control
Type L-847-2	Two circuit control
Type L-847-3	Three circuit control
Type L-847-4	Four circuit control

1.2.2 Class. Circuit selector switches of the following classes are covered by this specification:

Class A	Designed for indoor installations
Class B	Designed for outdoor installations

1.2.3 Rating. Circuit selector switches of the following ratings are covered by this specification:

Rating 1	Designed for <b>6.6</b> ampere, 5000 volt circuits
Rating 2	Designed for 20 ampere, 5000 volt circuits

2. APPLICABLE DOCUMENTS.

2.1 General. The following documents, of the issue in effect on the date of application for qualification, form part of this specification and are applicable to the extent specified herein.

2.2 Federal Aviation Administration (FAA) Documents.2.2.1 FAA Standard.

FAA-STD-012a	Paint Systems for Equipment
--------------	-----------------------------

2.2.2 FAA Advisory Circular.

AC 150/5345-1	Approved Airport Lighting Equipment
---------------	-------------------------------------

### 2.3 Military Standard.

MIL-STD-810C      Environmental Test Methods

(Copies of FAA standards may be obtained from the Federal Aviation Administration, Airway Facilities Service, Washington, D.C. 20591.)

(Copies of FAA advisory circulars may be obtained from the Department of Transportation, Publications Section, M-443.1, Washington, D.C. 20590.)

(Copies of military standards may be obtained from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120, Attention: Code 1052.)

### 3. REQUIREMENTS.

**3.1 General Functional Requirements.** The circuit selector **switch(es)** shall be capable of switching the output of a constant current regulator to one or more series lighting circuits (loops), as illustrated in figure **1**. The selector switch shall be controllable locally or from a remote location. External control switches for remote operation are to be supplied by others.

**3.2 Environmental Requirements.** The circuit selector **switch(es)** shall be designed for operations under the following environmental conditions:

- a. An ambient temperature range of **-55°C** to **+55°C**.
- b. A pressure altitude range of sea level to **10,000** feet (3 000 m).
- c. A relative humidity of up to **100** percent from sea level to **10,000** feet (3 000 m) at an ambient temperature of **+55° C**.

**3.3 Enclosures.** All components shall be mounted in an enclosure with a hinged access door capable of being padlocked. Class A selector switch enclosures shall be designed for wall mounting and be equal to a NEMA (National Electrical Manufacturers Association) type **1**. Class B selector switch enclosures shall be designed to allow bottom mounting by means of a **2-inch** conduit and be equal to a NEMA type 4. All external electrical wiring is to enter the enclosure through conduit. The size of the enclosure shall be held to a minimum consistent with good design practices. All high-voltage connections shall be made behind a dead front panel so as to be inaccessible when the enclosure door is opened to allow local control operations. The enclosure shall be painted in accordance with the applicable section of FAA-STD-012a. Class B enclosures shall be painted with an orange colored paint.

**3.4 High-Voltage Contacts.** The circuits shall be switched through a series of high-voltage contacts as shown in figure 1. When a circuit is to be energized, the normally open contacts close first followed by the opening of the normally closed contact across the constant current regulator input to the switch. The reverse procedure is followed when deenergizing the circuit. The contacts shall

be rated to interrupt a 6.6 ampere circuit for the Rating 1 switch and a 20 ampere circuit for the Rating 2 switch from a constant current regulated power source having a circuit voltage of up to 5000 volts. After 5000 cycles of switching, the assembly under load at rated current, the contact resistance of the relay switches shall not exceed 0.1 ohm.

**3.5 Switches.** Switches shall be provided to permit remote or local control and to make circuit selections. The control switch shall provide an OFF, REMOTE, and LOCAL function and be so marked. A switch with the capacity to provide local circuit selection of 1, 2, 3, or 4 lighting loops, according to circuit selector switch type, shall have markings of **S1**, S2, S3, S4 as appropriate. The control switch shall function as follows:

a. When the control switch is in the REMOTE position, the internal control circuitry shall allow single or multiple circuit selection to be made from a remote location.

b. When the control switch is in the OFF position, the input from the constant current regulator is short-circuited and unavailable for the lighting circuits.

c. When the control switch is in the LOCAL position, lighting circuit selections can be made locally.

**3.6 Terminals.** Suitable terminals shall be provided for the high-voltage connections from the constant current regulator and to the lighting circuits. Terminals or a terminal strip shall be provided for the control connections. The terminals shall be marked as follows:

a. **The input** terminals for connections from the constant current regulator shall be labeled **"R1"** and **"R2."**

b. The output terminals for the lighting circuit(s) shall be labeled "Loop 1, Loop 2", etc.

The terminals provided for control circuits shall be labeled as follows: **"L"** and **"LN"** for 120 volt ac input control voltage; "CR, C, C1", etc. for remote control **switch(es)**.

**3.7 Assembly.** All wire used shall have copper conductors of adequate current carrying capacity with insulation suitable for the working voltages encountered. Wires shall be properly trained and cabled. If printed circuit boards are used, they shall be easily removable for servicing or replacement. The switch assembly shall be constructed so that parts will not work loose during normal operations.

3.8 Nameplate. A nameplate, permanently and legibly filled in with at least the information listed below, shall be securely attached to the outside of the enclosure.

CIRCUIT SELECTOR SWITCH  
Manufacturer's name  
**Type** \_\_\_\_\_, Rating \_\_\_\_\_ **C l a s s**

3.9 Equipment Instruction Manual. A parts list with installation, maintenance, and repair instructions shall be furnished with each assembly. Schematic drawings and necessary illustrations shall be provided to indicate clearly the method of installation and the identity and location of all component parts to facilitate field repairs.

4. QUALITY ASSURANCE PROVISIONS.

4.1 Qualification Procedures. Procedures for obtaining qualification approval for equipment to be furnished for Federal grant assistance programs at airports are contained in the current edition of AC 150/5345-1, Approved Airport Lighting Equipment.

4.2 Qualification Tests. All tests contained in 4.4 are applicable for qualification.

4.3 Production Tests. The following tests are applicable for all production units: 4.4.3, 4.4.4, and 4.4.6.

4.4 Tests.

4.4.1 Temperature-Altitude. The test shall be in accordance with Procedure I, Method 504.1 of MIL-STD-810C for equipment in category 2. The equipment shall be tested at atmospheric pressures corresponding to sea level and **10,000** feet (3 000 m) altitude at both **-55°C** and **+55°C**. Make the following step substitutions to Table 504.1-11, Category 2 for this test:

Step	1a	1b	2	3	6	7	8	10	11
Temp (°C)	25	-55	-55	-55	55	55		55	
Alt (ft)	<b>10,000</b>	Site	Site	<b>10,000</b>	Site	Site	Omit	<b>10,000</b>	Omit
Time (hr)	1	4	--	--	16	#		4	

# Until temperature stabilizes

4.4.2 Humidity. The test shall be in accordance with Procedure I, Method 507.1 of MIL-STD-810C except that a total of two complete cycles (**48** hours) will be required.

4.4.3 Examination. Each assembly shall be inspected to assure compliance with the requirements specified herein with respect to materials, workmanship, and marking.

3/23/82

AC 150/5345-5A

4.4.4 Dielectric. Each assembly shall withstand the following alternating current voltage for 1 minute without failure:

- a. High-voltage input and output bushings to ground, 11,000 volts.
- b. Control circuit to ground, 1500 volts.

4.4.5 Load Test. The circuit selector switch shall be subjected to an operational test to demonstrate that the equipment will meet the requirements of 3.4. Rating 1 equipment shall be tested by switching a fully-loaded circuit of a 30 kw constant current regulator. Rating 2 equipment shall be tested by switching a fully-loaded circuit of a 70 kw constant current regulator. Multiple circuit selector switches shall be tested with one circuit loaded and the others **short-circuited** during the test.

4.4.6 Operation. Each assembly shall be tested to verify that the remote control circuit, the local control circuit, and the relay switches operate satisfactorily.

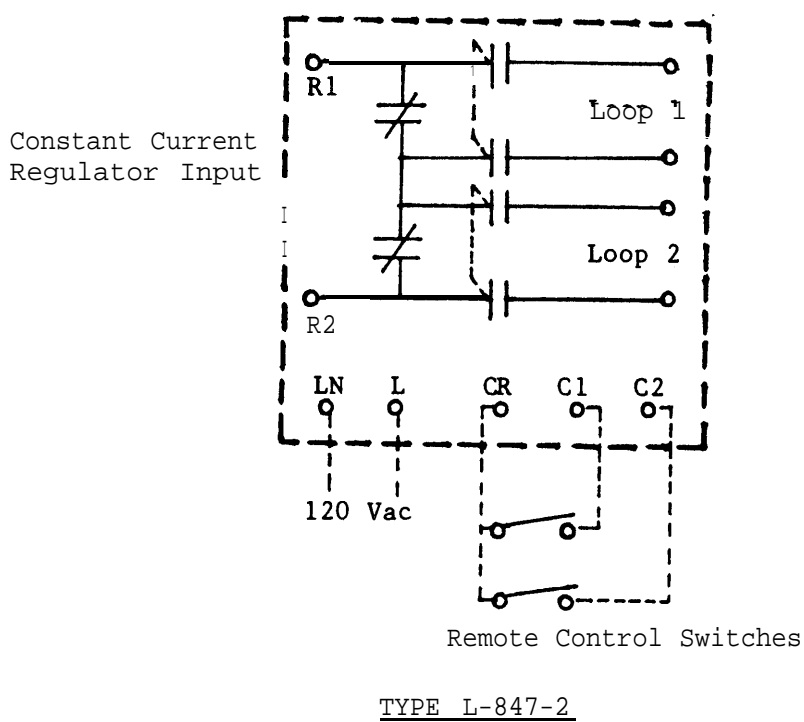
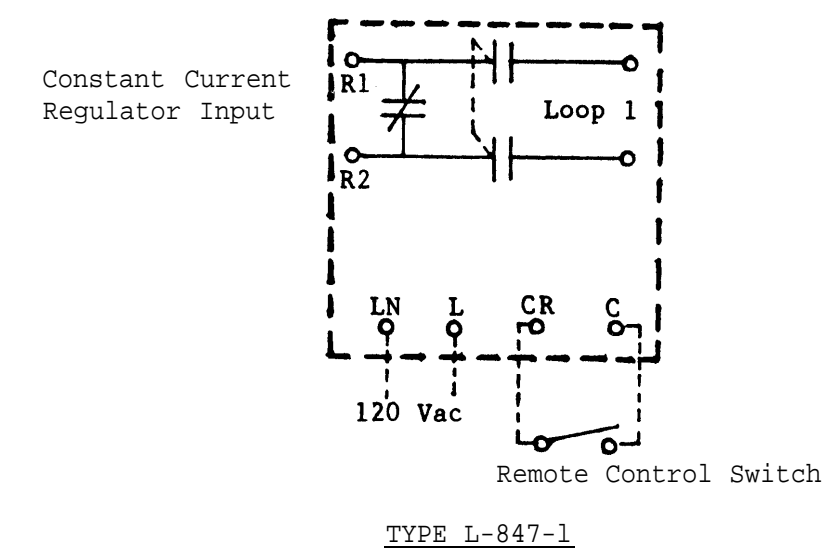


Figure 1. Typical relay contact arrangements.

DATE 3/23/82

# ADVISORY CIRCULAR



DEPARTMENT OF TRANSPORTATION  
Federal Aviation Administration  
Washington, D.C.

---

**Subject:** CIRCUIT SELECTOR SWITCH

1. PURPOSE: This advisory circular (AC) contains a specification for a circuit selector switch for use in airport lighting circuits.
2. EFFECTIVE DATE. Effective six months after the issue date of this advisory circular, only that equipment qualified in accordance with the specifications herein will be listed in AC 150/5345-1, Approved Airport Lighting Equipment, current edition.
3. CANCELLATION. AC 150/5345-5, Specification for L-847 Circuit Selector Switch, 5000 Volt 20 Ampere, dated September 3, 1963, is cancelled.
4. PRINCIPAL CHANGES. The specification has been rewritten to permit various designs of switches for both 6.6 and 20 ampere circuits.
5. METRIC UNITS. To promote an orderly transition to metric units, the specification includes both English and metric dimensions. The metric conversions may not be exact equivalents, and until an official changeover to metric units is effected, the English dimensions will govern.

A handwritten signature in dark ink, reading 'Leonard E. Mudd'.

Leonard E. Mudd  
Director, Office of Airport Standards

---

Initiated by: AAS-200



## CIRCUIT SELECTOR SWITCH

1. SCOPE AND CLASSIFICATION.

1.1 scope. This specification covers the requirements for a circuit selector switch to be used for switching the output of a constant current regulator to one or more series lighting loops.

1.2 Classification. Four types, two classes, and two sizes of circuit selector switches are covered by this specification.

1.2.1 Type. Circuit selector switches of the following types are covered by this specification:

Type L-847-1	One circuit control
Type L-847-2	Two circuit control
Type L-847-3	Three circuit control
Type L-847-4	Four circuit control

1.2.2 Class. Circuit selector switches of the following classes are covered by this specification:

Class A	Designed for indoor installations
Class B	Designed for outdoor installations

1.2.3 Rating. Circuit selector switches of the following ratings are covered by this specification:

Rating 1	Designed for <b>6.6</b> ampere, 5000 volt circuits
Rating 2	Designed for 20 ampere, 5000 volt circuits

2. APPLICABLE DOCUMENTS.

2.1 General. The following documents, of the issue in effect on the date of application for qualification, form part of this specification and are applicable to the extent specified herein.

2.2 Federal Aviation Administration (FAA) Documents.2.2.1 FAA Standard.

FAA-STD-012a	Paint Systems for Equipment
--------------	-----------------------------

2.2.2 FAA Advisory Circular.

AC 150/5345-1	Approved Airport Lighting Equipment
---------------	-------------------------------------

### 2.3 Military Standard.

MIL-STD-810C      Environmental Test Methods

(Copies of FAA standards may be obtained from the Federal Aviation Administration, Airway Facilities Service, Washington, D.C. 20591.)

(Copies of FAA advisory circulars may be obtained from the Department of Transportation, Publications Section, M-443.1, Washington, D.C. 20590.)

(Copies of military standards may be obtained from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120, Attention: Code 1052.)

### 3. REQUIREMENTS.

**3.1 General Functional Requirements.** The circuit selector **switch(es)** shall be capable of switching the output of a constant current regulator to one or more series lighting circuits (loops), as illustrated in figure 1. The selector switch shall be controllable locally or from a remote location. External control switches for remote operation are to be supplied by others.

**3.2 Environmental Requirements.** The circuit selector **switch(es)** shall be designed for operations under the following environmental conditions:

- a. An ambient temperature range of **-55°C** to **+55°C**.
- b. A pressure altitude range of sea level to **10,000** feet (3 000 m).
- c. A relative humidity of up to **100** percent from sea level to **10,000** feet (3 000 m) at an ambient temperature of **+55° C**.

**3.3 Enclosures.** All components shall be mounted in an enclosure with a hinged access door capable of being padlocked. Class A selector switch enclosures shall be designed for wall mounting and be equal to a NEMA (National Electrical Manufacturers Association) type 1. Class B selector switch enclosures shall be designed to allow bottom mounting by means of a **2-inch** conduit and be equal to a NEMA type 4. All external electrical wiring is to enter the enclosure through conduit. The size of the enclosure shall be held to a minimum consistent with good design practices. All high-voltage connections shall be made behind a dead front panel so as to be inaccessible when the enclosure door is opened to allow local control operations. The enclosure shall be painted in accordance with the applicable section of FAA-STD-012a. Class B enclosures shall be painted with an orange colored paint.

**3.4 High-Voltage Contacts.** The circuits shall be switched through a series of high-voltage contacts as shown in figure 1. When a circuit is to be energized, the normally open contacts close first followed by the opening of the normally closed contact across the constant current regulator input to the switch. The reverse procedure is followed when deenergizing the circuit. The contacts shall

be rated to interrupt a 6.6 ampere circuit for the Rating 1 switch and a 20 ampere circuit for the Rating 2 switch from a constant current regulated power source having a circuit voltage of up to 5000 volts. After 5000 cycles of switching, the assembly under load at rated current, the contact resistance of the relay switches shall not exceed 0.1 ohm.

**3.5 Switches.** Switches shall be provided to permit remote or local control and to make circuit selections. The control switch shall provide an OFF, REMOTE, and LOCAL function and be so marked. A switch with the capacity to provide local circuit selection of 1, 2, 3, or 4 lighting loops, according to circuit selector switch type, shall have markings of **S1**, S2, S3, S4 as appropriate. The control switch shall function as follows:

a. When the control switch is in the REMOTE position, the internal control circuitry shall allow single or multiple circuit selection to be made from a remote location.

b. When the control switch is in the OFF position, the input from the constant current regulator is short-circuited and unavailable for the lighting circuits.

c. When the control switch is in the LOCAL position, lighting circuit selections can be made locally.

**3.6 Terminals.** Suitable terminals shall be provided for the high-voltage connections from the constant current regulator and to the lighting circuits. Terminals or a terminal strip shall be provided for the control connections. The terminals shall be marked as follows:

a. **The input** terminals for connections from the constant current regulator shall be labeled **"R1"** and **"R2."**

b. The output terminals for the lighting circuit(s) shall be labeled "Loop 1, Loop 2", etc.

The terminals provided for control circuits shall be labeled as follows: **"L"** and **"LN"** for 120 volt ac input control voltage; "CR, C, C1", etc. for remote control **switch(es)**.

**3.7 Assembly.** All wire used shall have copper conductors of adequate current carrying capacity with insulation suitable for the working voltages encountered. Wires shall be properly trained and cabled. If printed circuit boards are used, they shall be easily removable for servicing or replacement. The switch assembly shall be constructed so that parts will not work loose during normal operations.

3.8 Nameplate. A nameplate, permanently and legibly filled in with at least the information listed below, shall be securely attached to the outside of the enclosure.

CIRCUIT SELECTOR SWITCH  
Manufacturer's name  
**Type** \_\_\_\_\_, Rating \_\_\_\_\_ **C l a s s**

3.9 Equipment Instruction Manual. A parts list with installation, maintenance, and repair instructions shall be furnished with each assembly. Schematic drawings and necessary illustrations shall be provided to indicate clearly the method of installation and the identity and location of all component parts to facilitate field repairs.

4. QUALITY ASSURANCE PROVISIONS.

4.1 Qualification Procedures. Procedures for obtaining qualification approval for equipment to be furnished for Federal grant assistance programs at airports are contained in the current edition of AC 150/5345-1, Approved Airport Lighting Equipment.

4.2 Qualification Tests. All tests contained in 4.4 are applicable for qualification.

4.3 Production Tests. The following tests are applicable for all production units: 4.4.3, 4.4.4, and 4.4.6.

4.4 Tests.

4.4.1 Temperature-Altitude. The test shall be in accordance with Procedure I, Method 504.1 of MIL-STD-810C for equipment in category 2. The equipment shall be tested at atmospheric pressures corresponding to sea level and **10,000** feet (3 000 m) altitude at both **-55°C** and **+55°C**. Make the following step substitutions to Table 504.1-11, Category 2 for this test:

Step	1a	1b	2	3	6	7	8	10	11
Temp (°C)	25	-55	-55	-55	55	55		55	
Alt (ft)	<b>10,000</b>	Site	Site	<b>10,000</b>	Site	Site	Omit	<b>10,000</b>	Omit
Time (hr)	1	4	--	--	16	#		4	

# Until temperature stabilizes

4.4.2 Humidity. The test shall be in accordance with Procedure I, Method 507.1 of MIL-STD-810C except that a total of two complete cycles (**48** hours) will be required.

4.4.3 Examination. Each assembly shall be inspected to assure compliance with the requirements specified herein with respect to materials, workmanship, and marking.

3/23/82

AC 150/5345-5A

4.4.4 Dielectric. Each assembly shall withstand the following alternating current voltage for 1 minute without failure:

- a. High-voltage input and output bushings to ground, 11,000 volts.
- b. Control circuit to ground, 1500 volts.

4.4.5 Load Test. The circuit selector switch shall be subjected to an operational test to demonstrate that the equipment will meet the requirements of 3.4. Rating 1 equipment shall be tested by switching a fully-loaded circuit of a 30 kw constant current regulator. Rating 2 equipment shall be tested by switching a fully-loaded circuit of a 70 kw constant current regulator. Multiple circuit selector switches shall be tested with one circuit loaded and the others **short-circuited** during the test.

4.4.6 Operation. Each assembly shall be tested to verify that the remote control circuit, the local control circuit, and the relay switches operate satisfactorily.

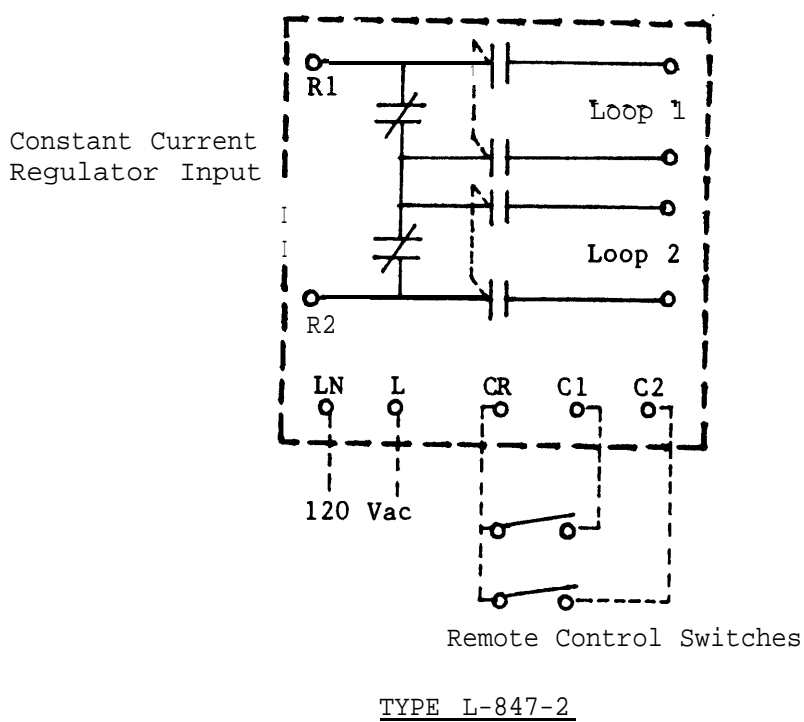
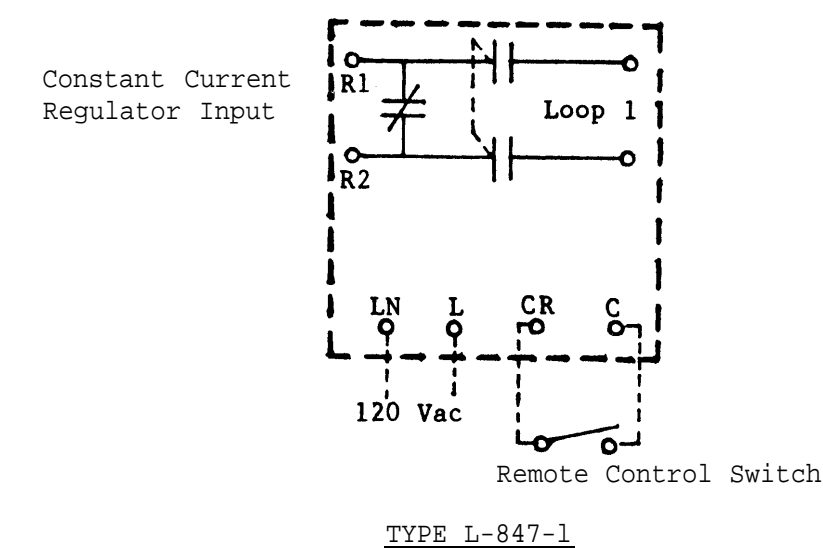


Figure 1. Typical relay contact arrangements.